CLAIMS

1. A method comprising:

orienting an interconnect with respect to a dense circuit device;

pressing the interconnect to the dense circuit device using a substrate; and

bonding the substrate to the dense circuit device sufficient to maintain the interconnect against the dense circuit device,

wherein the act of pressing comprises mechanically clamping the interconnect between the dense circuit device and the substrate.

2. The method of claim 1, wherein the act of orienting the interconnect comprises fitting a negative in the interconnect over a projection on the dense circuit device.

3. The method of claim 1, wherein the act of orienting comprises orienting wires of the interconnect with electrical bond pads of the dense circuit device.

4. The method of claim 3, wherein the wires and the electrical bond pads overlap and at the overlap have a breadth from tens of nanometers to tens of microns.

5. The method of claim 3, wherein the wires and the electrical bond pads overlap and at the overlap have a space from tens of nanometers to tens of microns.

6. The method of claim 3, wherein the wires and the electrical bond pads overlap and at the overlap have a breadth of less than one micron.

7. The method of claim 3, wherein the wires and the electrical bond pads overlap and at the overlap have a space of less than one micron.

8. The method of claim 3, wherein the wires comprise copper.

9. The method of claim 1, wherein the act of bonding comprises covalently bonding the dense circuit device to the substrate.

10. The method of claim 1, wherein the act of bonding comprises ionic bonding of the dense circuit device to the substrate.

11. The method of claim 1, wherein the act of bonding comprises bonding the dense circuit device to the substrate using an adhesive.

12. The method of claim 1, wherein the act of bonding is performed at low temperature.

13. The method of claim 12, wherein the low temperature comprises room temperature.

14. The method of claim 1, further comprising:

covalently bonding wires of the interconnect with electrical bond pads of the dense circuit device.

15. The method of claim 1, wherein the dense circuit device comprises a length or width of less than or about twenty-five millimeters.

16. The method of claim 1, wherein the dense circuit device and the interconnect have different coefficients of thermal expansion.

17. The method of claim 1, wherein the substrate comprises a second dense circuit device.

18. The method of claim 1, further comprising:

fixing a spacer substrate to the dense circuit device or the substrate, and wherein the act of bonding comprises bonding the spacer substrate to the other of the dense circuit die of the substrate to which the spacer substrate is not yet fixed.

19. The method of claim 18, wherein the act of bonding comprises covalent, low-temperature bonding.

20. The method of claim 18, wherein the act of bonding comprises bonding with an adhesive.

21. The method of claim 18, wherein the substrate comprises a second dense circuit device and the spacer substrate comprises conductive vias to allow electrical communication between the dense circuit device and the second dense circuit device.

22. The method of claim 1, further comprising:

orienting the interconnect over a second dense circuit device;

pressing the interconnect to the second dense circuit device using a second substrate; and

bonding the second substrate to the second dense circuit device sufficient to maintain the interconnect against the second dense circuit device.

23. The method of claim 22, wherein the substrate or the second substrate comprise a third dense circuit device.

24. The method of claim 22, wherein the act of orienting the interconnect over the second dense circuit device comprises fitting a negative in the interconnect over a projection on the second dense circuit device.

25. A method comprising:

providing a dense circuit device having a first surface prepared for covalent bonding;

providing a substrate having a second surface prepared for covalent bonding;

orienting an interconnect between the dense circuit device and the substrate; and

mechanically clamping the interconnect between the dense circuit device and the substrate by covalently bonding the first surface to the second surface.

26. The method of claim 25, wherein the act of providing the dense surface device comprises preparing the first surface and the act of providing the substrate comprises preparing the second surface.

27. The method of claim 25, wherein the acts of providing the dense circuit device and providing the substrate comprise planarizing the first surface and the second surface.

28. The method of claim 25, wherein the dense circuit device comprises a projection comprising the first surface and the act of orienting comprises fitting a negative of the projection in the interconnect over the projection.

29. The method of claim 25, wherein the substrate comprises a projection comprising the second surface and the act of orienting comprises fitting a negative of the projection in the interconnect over the projection.

30. The method of claim 25, wherein the act of orienting comprises placing the interconnect between two or more guides.

31. The method of claim 25, wherein the act of orienting comprises orienting wires of the interconnect with electrical bond pads of the dense circuit device.

32. The method of claim 31, wherein the wires and the electrical bond pads overlap and at the overlap have a breadth from about tens of nanometers to tens of microns.

33. The method of claim 31, wherein the wires and the electrical bond pads overlap and at the overlap have a breadth of less than one micron.

34. The method of claim 25, wherein the act of orienting comprises stiffening the interconnect.

35. The method of claim 25, wherein the act of mechanically clamping is performed at low temperature.

36. The method of claim 35, wherein the low temperature comprises room temperature.

37. The method of claim 25, further comprising forming a compliant layer between the interconnect and the substrate.

38. The method of claim 25, wherein the interconnect includes wires and a compliant layer.

39. The method of claim 25, wherein the interconnect includes wires, a compliant layer, and a stiffening layer.

40. The method of claim 25, wherein the interconnect includes grouped wires and an insulative layer.

41. The method of claim 25, wherein the first surface and the second surface comprise a silicon-containing material.

42. The method of claim 25, wherein the substrate comprises a second dense circuit device.

43. The method of claim 42, wherein the substrate and the first dense circuit device are separated by a spacer having conductive vias enabling electrical communication between the second dense circuit device and the first dense circuit device.

44. A method comprising:

planarizing a first surface of a dense circuit device;

planarizing a second surface of a spacer substrate;

planarizing a third surface of the spacer substrate;

planarizing a fourth surface of a clamping substrate;

covalently bonding one of the (a) first surface to the second surface or (b) the third surface to the fourth surface;

orienting an interconnect between the dense circuit device and the clamping substrate; and

mechanically clamping the interconnect to the dense circuit device by covalently bonding the other of the (a) first surface to the second surface or (b) the third surface to the fourth surface.

45. The method of claim 44, wherein the act of mechanically clamping is performed at low temperature.

46. The method of claim 44, wherein the dense circuit device comprises a dimension of less than or about twenty-five millimeters.

47. The method of claim 44, wherein the clamping substrate comprises a second dense circuit device.

48. The method of claim 47, wherein the interconnect comprises two sets of wires, the first set contacting the first dense circuit device and the second set contacting the second dense circuit device.

49. A method comprising:

preparing a first surface of a projection on a dense circuit device for covalent bonding to a second surface of an interconnect.

50. The method of claim 49, further comprising:

preparing the second surface in a depression in the interconnect for covalent bonding;

orienting the projection in the depression; and

covalently bonding the first surface with the second surface.

51. The method of claim 50, wherein the depression is generally a negative of the projection.

52. The method of claim 50, wherein the act of orienting comprises orienting electrical bond pads of the dense circuit device with wires of the interconnect.

53. The method of claim 52, wherein the dense circuit device has a length or width of less than or about twenty-five millimeters and the electrical bond pads or the wires are less than one micron in breadth.

54. The method of claim 52, wherein the dense circuit device has a length or width of less than or about five millimeters and the electrical bond pads or the wires are less than or about ten microns in breadth.

55. The method of claim 50, wherein the act of covalently bonding mechanically bonds wires of the interconnect with electrical bond pads of the dense circuit device.

56. A system comprising:

a dense circuit device having a length or width of less than or about twenty-five millimeters and electrical bond pads having a breadth of less than one micron;

an interconnect having wires with a breadth of less than one micron and electrically connected to the electrical bond pads; and

a clamping substrate clamping the interconnect to the dense circuit device.

57. The system of claim 56, wherein the wire's breadth is less than one micron.

58. The system of claim 56, wherein the electrical bond pads' breadth and the wires' breadth is about one nanometer to one micron.

59. The system of claim 56, wherein the dense circuit device comprises a silicon-containing material.

60. The system of claim 56, wherein the dense circuit device comprises a compliant layer.

61. The system of claim 56, wherein the dense circuit device and the clamping substrate comprise a silicon-containing material.

62. The system of claim 56, wherein the interconnect comprises a compliant layer.

63. The system of claim 56, wherein the electrical bond pads comprise palladium or platinum.

64. The system of claim 56, wherein the wires comprise copper.

65. The system of claim 56, further comprising a compliant layer.

66. The system of claim 65, wherein the complaint layer is between the wires and the clamping substrate.

67. The system of claim 65, wherein the compliant layer comprises a polyimide.

68. The system of claim 65, wherein the compliant layer provides a reactive force to aid in maintaining the clamping of the interconnect to the dense circuit device.

69. The system of claim 56, wherein the dense circuit device and the interconnect have different coefficients of thermal expansion.

70. The system of claim 56, wherein the clamping substrate and the dense circuit device are bonded together with a covalent bond.

71. The system of claim 56, wherein the interconnect comprises grouped wires.

72. The system of claim 71, wherein the grouped wires comprise an insulative layer and part of the insulative layer is clamped between the wires and the clamping substrate.

73. The system of claim 56, wherein the clamping substrate and the dense circuit device are each bonded to a spacer substrate.

74. The system of claim 56, wherein the clamping substrate comprises a compliant layer.

75. The system of claim 56, wherein the clamping substrate comprises a second dense circuit device.

76. The system of claim 56, wherein the clamping substrate comprises a second dense circuit device and the clamping substrate and the first dense circuit device are each bonded to a spacer substrate having conductive vias allowing electrical communication between the first and second dense circuit devices.

77. The system of claim 56, wherein the clamping substrate comprises a second dense circuit device having second electrical bond pads and the interconnect comprises second wires electrically connected to the second electrical bond pads.

78. An assembly, comprising:

a dense circuit device;

an interconnect for electrically connecting the dense circuit device to one or more other devices; and

wherein the interconnect is covalently bonded to the dense circuit device.

79. The assembly of claim 78, wherein the dense circuit device and the interconnect have different coefficients of thermal expansion.

80. The assembly of claim 78, wherein the interconnect comprises grouped wires.

81. The assembly of claim 78, wherein the interconnect comprises a compliant layer.

82. An assembly, comprising:

a dense circuit device having a length or width of less than or about twenty-five millimeters;

an interconnect;

a substrate; and

wherein the interconnect is clamped between the substrate and the dense circuit device; and

wherein the substrate is covalently bonded to the dense circuit device.

83. The assembly of claim 82, wherein the clamping substrate comprises a second dense circuit device.

84. The assembly of claim 82, wherein the interconnect electrically connects the dense circuit device to the second dense circuit device.

85. The assembly of claim 82, wherein the interconnect comprises grouped wires.

86. The assembly of claim 82, wherein the interconnect comprises a compliant layer.